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VALLEY RECYCLING DESIGNS NEW FACILITY USING SIMULATION

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ABSTRACT

Valley Recycling is opening a new recycling operation adjacent to their current facility near downtown San Jose. The new site is expected to allow Valley Recycling to process significantly greater volume of trucks unloading recycling material. Prior to opening the new site, Valley Recycling utilized simulation and industrial engineering support provided by Sustainable Productivity Solutions to determine how to best streamline truck movement on this new site so as to: 1) Avoid having trucks stretching out onto the main road which would incur traffic fines from the City of San Jose, 2) Avoid having to turn trucks away, 3) Avoid hiring additional employees, after startup, to make system work, 4) Optimize flow so as to maximize volume of trucks processed, and 5) Increase customer satisfaction by minimizing time spent waiting in line

1 MODELING OBJECTIVES AND PROCESS

The Valley Recycling simulation model was used to determine the optimal flow of traffic through the facility for both current and future increased demand levels. In addition, the model was used to understand how likely it is that long queues will build up forcing management to turn customers away in order to prevent them from lining up on the main road, which is undesirable and will result in traffic fines. Lastly, the model was used to determine if any additional resources (e.g., operators, scales, loading equipment) are needed to optimally run the facility.

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Sustainable Productivity Solutions developed a computer simulation model using ProModel simulation software and then reviewed and validated the model to ensure its accuracy. Once validated, the model was used to experiment with multiple operating scenarios.

2 IMPACT OF DEMAND ON FACILITY DESIGN

A major finding of this modeling and simulation effort was that operating the new site much like the existing site (i.e., current-day operating scenario) will be effective as long as daily demand does not exceed 50% increase from current levels. If the daily demand rate increases to this level, customers will experience some delays associated with paying for service, as this was determined to be the system bottleneck, but there are no concerns that trucks will have to line up and wait on the main road to enter the facility.

Valley Recycling's management team foresees that daily demand may increase by 100% from current levels (demand doubles), which means they will have to adopt a new operating scenario at some point in

the future. In order for the new site to operate efficiently with this increase in demand, a minimum of 2 cashiers and an additional inbound queue and scale are needed. An alternative solution is to reduce the cycle time for customers to weigh-in on the inbound scale so that this location is no longer a bottleneck.

Another operating scenario that was explored involved increasing the number of customers with accounts/tare weights on file. If a customer has an account/tare weight on file, it is assumed they would be able to skip the weigh out and paying processes altogether. This operating scenario would reduce the average time spent at the facility but this solution alone will not help with delayed entries into the facility when demand doubles.

Lastly, the simulation model allowed for experimentation on reversing the direction of flow at the facility. This operating scenario did not have a significant impact on system performance (e.g., cycle time, delayed entry); however, a reversed flow could be safer for customers that are walking to/from the cashiers.